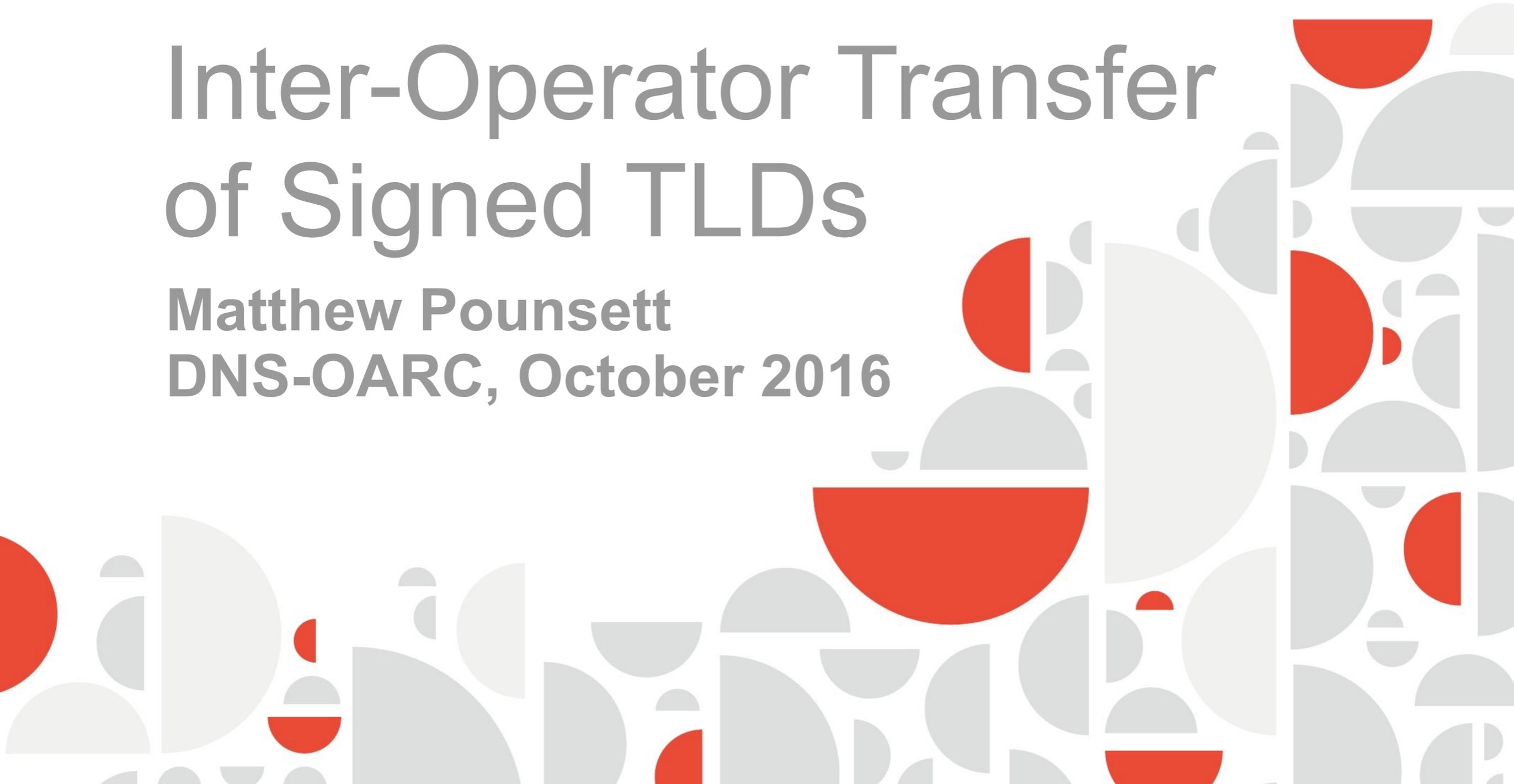# Rightside®

Inter-Operator Transfer of Signed TLDs

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DNS-OARC, October 2016

Agenda

Known transfers to have occurred

Operational roles in the gTLD environment

RFC 6781 procedure

Our transfer experiences and procedures used

Lessons for operators & resulting work

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Known Transfers

REISE: June 2015

JETZT: May 2016

First signed transfers to have occurred that we know of.

Anyone else know of any? We'd love to talk to the involved operators about their experiences.

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Operational Roles

RO: Registry Operator

BRO: Back-end Registry Operator — service provider to RO

DNS Op: DNS Operator — service provider to RO or BRO

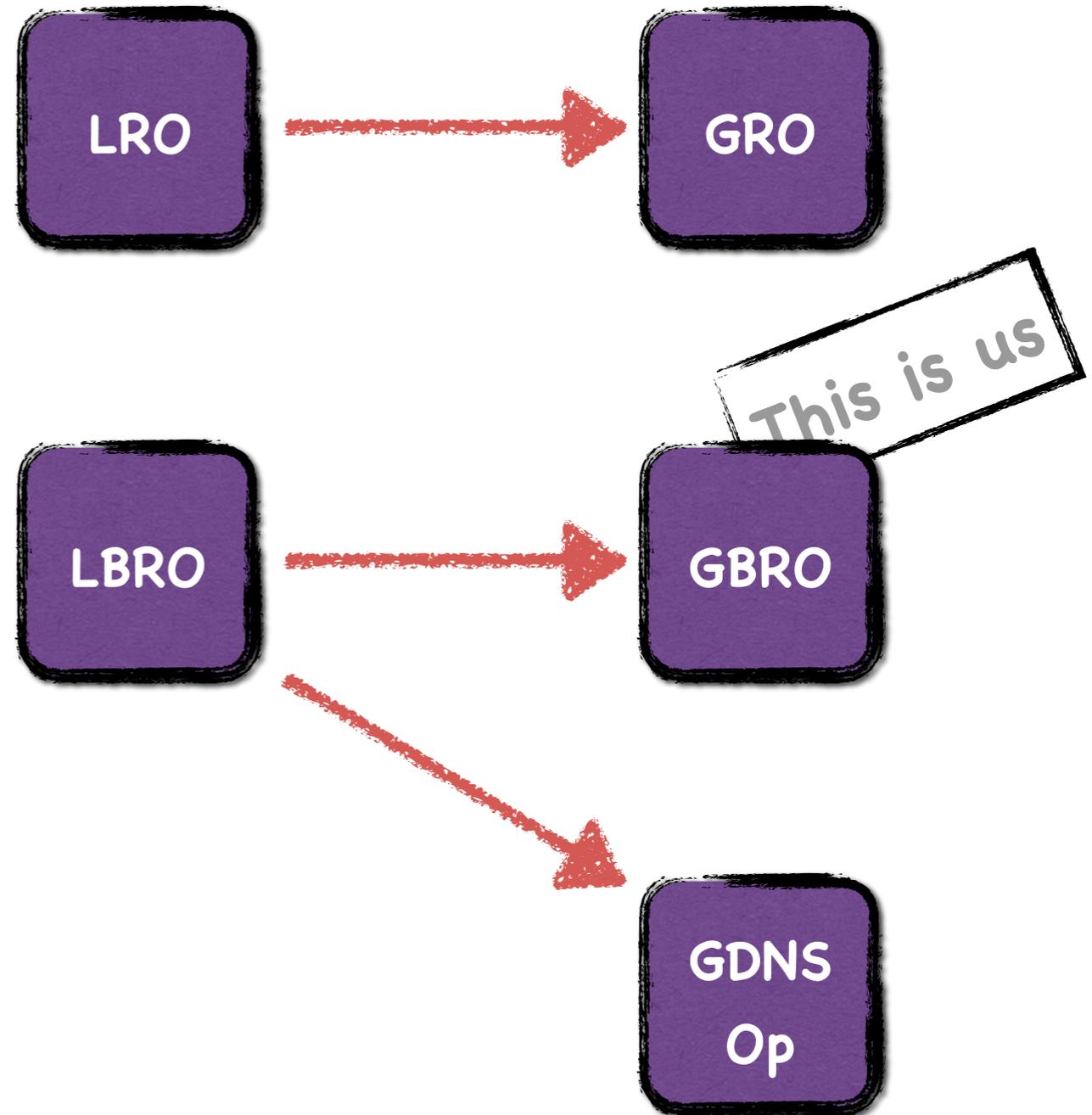**In a transfer, there are Losing and Gaining variations on all three**

RO

BRO

DNS Op

Who's Involved?

In the transfers we've been involved in:

- **LRO transfers to GRO**

- **LBRO transfers to GBRO & GDNSOp**

Don't forget the parent: IANA

LRO → GRO

LBRO → GBRO

LBRO → GDNS Op

This is us

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RFC 6781 § 4.3.5.1

Initial
Parent
NS_A DS_A
Child at A
SOA_A0 RRSIG_Z_A(SOA)
NS_A RRSIG_Z_A(NS)
DNSKEY_Z_A DNSKEY_K_A RRSIG_K_A(DNSKEY)

Pre-Publish	
Parent	
NS_A DS_A	
Child at A	**Child at B**
SOA_A1 RRSIG_Z_A(SOA)	SOA_B0 RRSIG_Z_B(SOA)
NS_A NS_B RRSIG_Z_A(NS)	NS_B RRSIG_Z_B(NS)
DNSKEY_Z_A DNSKEY_Z_B DNSKEY_K_A DNSKEY_K_B RRSIG_K_A(DNSKEY) RRSIG_K_B(DNSKEY)	DNSKEY_Z_A DNSKEY_Z_B DNSKEY_K_A DNSKEY_K_B RRSIG_K_A(DNSKEY) RRSIG_K_B(DNSKEY)

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RFC 6781 § 4.3.5.1

Re-Delegation		Post-Migration	
Parent		**Parent**	
NS_B DS_B		NS_B DS_B	
Child at A	**Child at B**	**Child at B**	
SOA_A1 RRSIG_Z_A(SOA)	SOA_B0 RRSIG_Z_B(SOA)	SOA_B1 RRSIG_Z_B(SOA)	
NS_A NS_B RRSIG_Z_A(NS)	NS_B RRSIG_Z_B(NS)	NS_B RRSIG_Z_B(NS)	
DNSKEY_Z_A DNSKEY_Z_B DNSKEY_K_A DNSKEY_K_B RRSIG_K_A(DNSKEY) RRSIG_K_B(DNSKEY)	DNSKEY_Z_A DNSKEY_Z_B DNSKEY_K_A DNSKEY_K_B RRSIG_K_A(DNSKEY) RRSIG_K_B(DNSKEY)	DNSKEY_Z_B DNSKEY_K_B RRSIG_K_B(DNSKEY)	

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Limitations of 6781

Assumes operators can easily publish slightly different versions of the same zone

Operators of frequently changing zones, or zones automatically generated from a registration database unlikely to be able to do this

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The REISE Transfer

Initial	Pre-Publish	DS Change I
Parent	**Parent**	**Parent**
NS_A	NS_A	NS_A
DS_A	DS_A	DS_A DS_B
Children	**Children**	**Children**
SOA_A0 RRSIG_Z_A(SOA)	SOA_A1 RRSIG_Z_A(SOA)	SOA_A1 RRSIG_Z_A(SOA)
NS_A RRSIG_Z_A(NS)	NS_A RRSIG_Z_A(NS)	NS_A RRSIG_Z_A(NS)
DNSKEY_Z_A DNSKEY_K_A RRSIG_K_A(DNSKEY)	DNSKEY_Z_A DNSKEY_Z_B DNSKEY_K_A DNSKEY_K_B RRSIG_K_A(DNSKEY)	DNSKEY_Z_A DNSKEY_Z_B DNSKEY_K_A DNSKEY_K_B RRSIG_K_A(DNSKEY)

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The REISE Transfer

DS Change I
Parent
NS_A DS_A DS_B
Children
SOA_A1 RRSIG_Z_A(SOA)
NS_A RRSIG_Z_A(NS)
DNSKEY_Z_A DNSKEY_Z_B DNSKEY_K_A DNSKEY_K_B RRSIG_K_A(DNSKEY)

Move Traffic
Parent
NS_A DS_A DS_B
Children
SOA_A2 RRSIG_Z_A(SOA)
NS_B RRSIG_Z_A(NS)
DNSKEY_Z_A DNSKEY_Z_B DNSKEY_K_A DNSKEY_K_B RRSIG_K_A(DNSKEY)

Re-Delegation
Parent
NS_B DS_A DS_B
Children
SOA_A2 RRSIG_Z_A(SOA)
NS_B RRSIG_Z_A(NS)
DNSKEY_Z_A DNSKEY_Z_B DNSKEY_K_A DNSKEY_K_B RRSIG_K_A(DNSKEY)

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The REISE Transfer

Re-Delegation
Parent
NS_B DS_A DS_B
Children
SOA_A2 RRSIG_Z_A(SOA)
NS_B RRSIG_Z_A(NS)
DNSKEY_Z_A DNSKEY_Z_B DNSKEY_K_A DNSKEY_K_B RRSIG_K_A(DNSKEY)

Signing Transfer
Parent
NS_B DS_A DS_B
Children
SOA_A2 RRSIG_Z_B(SOA)
NS_B RRSIG_Z_B(NS)
DNSKEY_Z_A DNSKEY_Z_B DNSKEY_K_A DNSKEY_K_B RRSIG_K_B(DNSKEY)

DS Change II
Parent
NS_B DS_B
Children
SOA_A2 RRSIG_Z_B(SOA)
NS_B RRSIG_Z_B(NS)
DNSKEY_Z_A DNSKEY_Z_B DNSKEY_K_A DNSKEY_K_B RRSIG_K_B(DNSKEY)

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The REISE Transfer

DS Change II	Remove old DNSKEYs	Post-Migration
Parent	**Parent**	**Parent**
NS_B	NS_B	NS_B
DS_B	DS_B	DS_B
Children	**Children**	**Children**
SOA_A2 RRSIG_Z_B(SOA)	SOA_A3 RRSIG_Z_B(SOA)	SOA_B0 RRSIG_Z_B(SOA)
NS_B RRSIG_Z_B(NS)	NS_B RRSIG_Z_B(NS)	NS_B RRSIG_Z_B(NS)
DNSKEY_Z_A DNSKEY_Z_B DNSKEY_K_A DNSKEY_K_B RRSIG_K_B(DNSKEY)	DNSKEY_Z_B DNSKEY_K_B RRSIG_K_B(DNSKEY)	DNSKEY_Z_B DNSKEY_K_B RRSIG_K_B(DNSKEY)

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REISE Transition Results

No process errors in the transition

No DNS resolution problems

Long procedure with many steps and lots of waiting

Had to back out mid-way for Pre-Delegation Testing (PDT)

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The JETZT Transfer

Initial	Pre-Publish	Re-Delegation I
Parent	**Parent**	**Parent**
NS_A DS_A	NS_A DS_A	 NS_B DS_A DS_B
Children	**Children**	**Children**
SOA_A0 RRSIG_Z_A(SOA)	SOA_A1 RRSIG_Z_A(SOA)	SOA_A1 RRSIG_Z_A(SOA)
NS_A RRSIG_Z_A(NS)	 NS_B RRSIG_Z_A(NS)	 NS_B RRSIG_Z_A(NS)
DNSKEY_Z_A DNSKEY_K_A RRSIG_K_A(DNSKEY)	DNSKEY_Z_A DNSKEY_Z_B DNSKEY_K_A DNSKEY_K_B RRSIG_K_A(DNSKEY)	DNSKEY_Z_A DNSKEY_Z_B DNSKEY_K_A DNSKEY_K_B RRSIG_K_A(DNSKEY)

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The JETZT Transfer

Re-Delegation I	Signing Transfer	Re-Delegation II
Parent	**Parent**	**Parent**
NS_B DS_A DS_B	NS_B DS_A DS_B	NS_B DS_B
Children	**Children**	**Children**
SOA_A1 RRSIG_Z_A(SOA)	SOA_A2 RRSIG_Z_B(SOA)	SOA_A2 RRSIG_Z_B(SOA)
NS_B RRSIG_Z_A(NS)	NS_B RRSIG_Z_B(NS)	NS_B RRSIG_Z_B(NS)
DNSKEY_Z_A DNSKEY_Z_B DNSKEY_K_A DNSKEY_K_B RRSIG_K_A(DNSKEY)	DNSKEY_Z_A DNSKEY_A_B DNSKEY_K_A DNSKEY_K_B RRSIG_K_B(DNSKEY)	DNSKEY_Z_A DNSKEY_Z_B DNSKEY_K_A DNSKEY_K_B RRSIG_K_B(DNSKEY)

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The JETZT Transfer

Re-Delegation II
Parent
NS_B   DS_B
Children
SOA_A2   RRSIG_Z_B(SOA)
NS_B   RRSIG_Z_B(NS)
DNSKEY_Z_A   DNSKEY_Z_B   DNSKEY_K_A   DNSKEY_K_B   RRSIG_K_B(DNSKEY)

Post-Migration
Parent
NS_B   DS_B
Children
SOA_B0   RRSIG_Z_B(SOA)
NS_B   RRSIG_Z_B(NS)
DNSKEY_Z_B   DNSKEY_K_B   RRSIG_K_B(DNSKEY)

JETZT Transition Results

No process errors in the transition

An operational error at the LBRO in the Pre-Publish phase caused validation failures for up to two hours

Faster procedure with fewer steps, and less interaction with the parent.

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Lessons

Plan in detail!

Operators need to test procedures (even ones they don't expect to need)

Know your software's limitations and sharp edges

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Future Work

gTLD namespace continues to expand, and there are dozens if not hundreds of brand new operators running TLDs

TLDs will change hands with increasing frequency, either by purchase, merger, or bankruptcy. All of these new operators need guidance they can implement

working on a new I-D to provide these operators guidance

https://datatracker.ietf.org/doc/draft-pounsett-transferring-automated-dnssec-zones/
https://github.com/mpounsett/operator-transfer

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Questions or Comments?

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